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(30)Priority

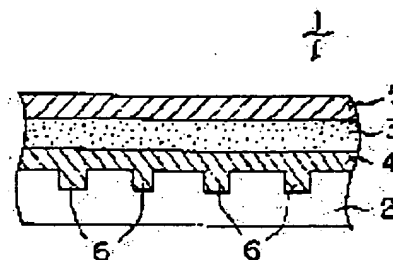
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(54) OPTICAL RECORDING MEDIUM

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an optical recording medium having a reflection film with high reflectance and excellent corrosion resistance at a low cost by using a thin film of Ag containing a specified amt. of Cu as the reflection film instead of a conventional Au thin film or an Au alloy thin film.

SOLUTION: This optical recording medium CD-R1 is produced by successively forming a dye film 4 as a recording layer, a Cu-Ag reflection film 3 and a protective film 5 on a substrate 2 which is transparent for the light to be used. The reflection film 3 has a compsn. of 0.1 to 15atm.% Cu and 85 to 99.9atm.% Ag. The reflection film 3 can be formed directly on the dye film 4 by well-known sputtering or vacuum vapor deposition method, or with another film interposed. The reflection film 3 is preferably formed to 50 to 150nm thickness. Thereby, an optical recording medium having a reflection film of high reflectance and excellent corrosion resistance can be obtd. at a low cost.



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CLAIMS

[Claim(s)]

[Claim 1] The optical recording medium by which a reflective film is characterized by the bird clapper in the optical recording medium by which the reflective film was prepared on the substrate from 0.1 to Cu15 atom %, and 85 to Ag99.9 atom %.

[Claim 2] The optical recording medium according to claim 1 by which a reflective film consists of one to Cu10 atom %, and 90 to Ag99 atom %.

[Claim 3] The optical recording medium according to claim 1 or 2 by which the coloring matter film as a record layer is prepared in the middle of the above-mentioned substrate and the above-mentioned reflective film.

[Claim 4] The optical recording medium according to claim 1 or 2 on which two or more pits are formed in the above-mentioned substrate, and information is recorded by these pits possible [read] by light.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the optical recording medium which has the reflective film excellent in a high reflection factor and corrosion resistance.

[0002]

[Description of the Prior Art] It is reproducible by the compact disk player only for reproduction, drive, etc. after record while the optical recording medium equipped with the recordable field directly recordable on a disk, for example, a recordable compact disk, is recordable.

[0003] The alloy which makes Au or Au a principal component is used for the reflective film of CD-R which is one sort of the compact disk in which the above-mentioned record is possible. To the laser wavelength of 780nm for reading the recorded information, even if a coloring matter record layer carries out the reflective film which consists of an alloy which makes Au or Au a principal component under existence, it can realize 65% or more of high reflection factor, and it has high corrosion resistance. However, since the reflective film which consists of an alloy which makes Au or Au a principal component is expensive, it serves as a cause of cost elevation of the above-mentioned CD-R.

[0004] Since it is inferior to corrosion resistance when the alloy which, on the other hand, makes a principal component metals, such as Ag, cheap Cu, cheap aluminum, etc., and these is used as a reflective film, the performance of disks, such as decline in a reflection factor based on corrosion and an increase in an error, carries out aging. Therefore, it excelled in a high reflection factor and corrosion resistance, and, moreover, an appearance of a cheap reflective film was desired to CD-R.

[0005] A reflective film makes a principal component at least one sort of the element chosen from Ag, Au, Cu, and Pt, and the optical magnetic medium which makes a principal component at least one sort of the element with which a middle thin film is chosen from Zn, aluminum, Sn, In, Cd, Tl, Pb, and Bi is indicated by JP.4-228128,A. However, in the official report concerned, Ag reflective film is recognized to be best and neither indication nor suggestion is substantially carried out about the reflective film which consists of Ag and Cu. Moreover, in the official report concerned, the technology about the so-called CD of the write once type which uses a mineral matter as record film is indicated.

[0006] Since a high reflection factor is not needed so much for the reflective film of compact disks (it says Following CD), such as CD-Audio and CD-ROM, which imprints a pit to a substrate and is manufactured on structure using metal mold, aluminum is usually used.

[0007] However, since light is absorbed with the coloring matter concerned in optical disks, such as CD-R which has organic system coloring matter as record film, for example, rather than the above-mentioned compact disk, the high reflective film of a reflection factor is needed and Au is usually used as a reflective film by CD-R as mentioned above. If only a reflection factor is considered, Ag of a reflection factor will be higher than Au. However, since, as for Ag, a reflection factor falls with time by being inferior to corrosion resistance from Au, the reflective film which consists only of Ag is unsuitable as a reflective film of CD-R, and the present condition is that Au still expensive as a reflective film of CD-R is used after all.

[0008]

[Problem(s) to be Solved by the Invention] Therefore, the purpose of this invention is to have the reflective film which was moreover excellent in corrosion resistance with the high reflection factor, and offer the optical recording medium of a low cost.

[0009]

[Means for Solving the Problem] This invention persons did the knowledge of the fact that the thin film which made Cu of the amount of specification contain [as opposed to / Ag / unexpectedly] is moreover excellent in corrosion resistance with a high reflection factor, as a result of inquiring wholeheartedly that the above-mentioned purpose should be attained. this invention was made based on the above-mentioned knowledge, and attains the above-mentioned purpose in the optical recording medium by which the reflective film was prepared on the substrate by offering the optical recording medium by which a reflective film is characterized by the bird clapper from 0.1 to Cu15 atom %, and 85 to Ag99.9 atom %.

[0010] The thin film of the comparatively simple composition which consists of above Cu(s) and Ag was excellent in corrosion resistance, the fact of giving the reflective film for optical recording media of a high reflection factor was not known conventionally, but it was a just surprising fact. Hereafter, the optical recording medium of this invention is explained in detail.

[0011]

[The gestalt for inventing] The optical recording medium in this invention has the structure where the reflective film was prepared on the substrate, and includes what can record information by light, the thing which can read the recorded information by light, the thing which can eliminate or rewrite record by light.

[0012] The optical disk (CD-E) in which elimination of the compact disk (CD) which can read the information which information was recorded by the pit formed as an example of an optical recording medium on the recordable optical disk (CD-R) which has a coloring matter thin film as a record layer, and the substrate, and was recorded by light, other magneto-optic disks (MD or MO), a phase-change optical disk (PD), and record and rewriting are possible can be mentioned.

[0013] First, the recordable compact disk (CD-R) which is one mode of the optical recording medium of this invention is explained, referring to [drawing 1]. [Drawing 1] is the type section view of the direction of a radius of CD-R, and the coloring matter film 4 as a record layer, the reflective film 3 which consists of Cu-Ag, and the protective coat 5 are carrying out the laminating in this sequence on the transparent substrate 2 to the light to be used. In the reflective film concerning this invention, any of the gestalt of the mixture [gestalt / [the alloy as used in the field of this invention means what was defined by the item of the alloy of the Iwanami physicochemistry dictionary (the 3rd edition enlarged edition of February 24, 1981 issue)] / of the alloy which consists of Cu-Ag] of Cu and Ag, or the gestalt to which the laminating of the thin film which consists of Cu, and the thin film which consists of Ag was carried out are sufficient. Moreover, although the gestalt with which they were joined is sufficient, the thin film formation by the vacuum deposition is simple.

[0014] As a material which forms a substrate 2, plastics, glass, etc., such as a polycarbonate and a polymeter kuru acid methyl, can be mentioned. A polycarbonate is desirable especially. The thickness of a substrate 2 is usually 1.2mm. And that in which the spiral guide rail 6 which acts as an irradiation guide of laser is formed is usually used.

[0015] If the energy of light, for example, laser, is absorbed and it generates heat enough as coloring matter of the coloring matter film 4, it will not be restricted especially. Specifically, the cyanine system coloring matter which is an organic coloring matter, squarylium system coloring matter, crocodile NIUMU system coloring matter, AZURENIUMU system coloring matter, triaryl amine coloring matter, anthraquinone system coloring matter, metal-containing azo system coloring matter, dithiol metallic complex system coloring matter, India aniline metal complex system coloring matter, phthalocyanine system coloring matter, naphthalocyanine system coloring matter, CT complex system coloring matter between molecules, etc. are used suitably. these are independent -- it is -- it can use together and use Moreover, an antioxidant, a binder, etc. can be added on the coloring matter film 4.

[0016] Although the method of dissolving an organic coloring matter in an organic solvent, and carrying out a spin coat on the transparent substrate 2 as a method of forming the coloring matter film 4 containing an organic coloring matter is used preferably, a vacuum deposition can also be used about the coloring matter which has sublimability like phthalocyanine system coloring matter. The thickness of the coloring matter film 4 is suitably chosen according to the optical physical properties of the wavelength to be used and the reflective film 3, the quality of the material of the coloring matter film 4, etc. in consideration of record sensitivity, figure of merit, etc. to the luminous energy used in order to record [laser], and the range of it is usually 120-150nm. Although the coloring matter film 4 is not illustrated, you may prepare it in both sides of a transparent substrate.

[0017] this invention -- setting -- the reflective film 3 -- 0.1 to Cu15 atom % -- it consists of one to 10 atom %, and the remainder Ag preferably Composition of the above-mentioned reflective film 3 is important, and the corrosion-resistant reflective film which was excellent with the reflection factor which was excellent in composition of the above-mentioned range is obtained. When Cu content is under 0.1 atom %, in any [in case Cu content exceeds 15 atom %] case, it is inferior to corrosion resistance, and by aging, a reflection factor falls and error generating at the time of CD-R reading increases.

[0018] The above-mentioned reflective film 3 can be formed by the well-known sputtering method and the vacuum deposition method in itself through direct or other films on the above-mentioned coloring matter film 4. As for the thickness of the above-mentioned reflective film 3, it is desirable to be referred to as 50-150nm.

[0019] Furthermore, you may perform surface treatment by coupling agent, such as a triazine thiol system compound, to the front face of the above-mentioned reflecting layer film 3 if needed.

[0020] It is suitable to use the material of hard nature, such as acrylic ultraviolet-rays hardening resin, as a protective layer 5 formed on the above-mentioned reflective film 3, and usually, after applying by the thickness of 2-20 micrometers by the spin coat method on a reflective film, it can be made to be able to harden by UV irradiation and can form.

[0021] Next, information is recorded by the combination of two or more pits formed in the substrate which is other one mode of the optical recording medium of this invention, and the compact disk (CD) which reads this recording information by light is explained with reference to [drawing 2]. [Drawing 2] is the type section view of the direction of a truck of CD, and the laminating of the reflective film 3 and the protective coat 5 is carried out to the transparent substrate 2 in this sequence to the light to be used.

[0022] What indicated CD-R can be used as a material which forms the above-mentioned substrate 2, and it is a polycarbonate preferably. The thickness of a substrate 2 is also the thickness which indicated the case of CD-R. Two or more pits 7 exist in the above-mentioned substrate, and information is recorded on it by these pits.

[0023] The thickness of composition of Cu-Ag which forms the reflective film 3, and a reflective film, the method of forming a reflective film, etc. may be applied including a mode with desirable having indicated CD-R. Having indicated CD-R also about the protective coat furthermore may be applied.

[0024] Since the above-mentioned optical recording medium of this invention explained above is size so that the reflection factor of the above-mentioned reflective film fulfills CD-R specification, a high output is obtained at the time of reading. When this designs an optical recording medium, there is an advantage to which the width of face of selection of the coloring matter in the case of CD-R spreads. Moreover, even when designing CD drive, the width of face of selection of the kind of laser beam used at the time of reading spreads, and even if the power of a laser beam falls somewhat by a certain reason, the advantage on the design of being able to continue and use it may arise further. Moreover, since the above-mentioned reflective film is excellent in corrosion resistance, the decline in the reflection factor accompanying the passage of time and the increase in generating of a reading error are suppressed. And since the above-mentioned reflective film is cheap, the contribution to the cost reduction of an optical recording medium is size.

[0025]

[Example] Hereafter, this invention is not restricted by the example although an example explains this invention concretely.

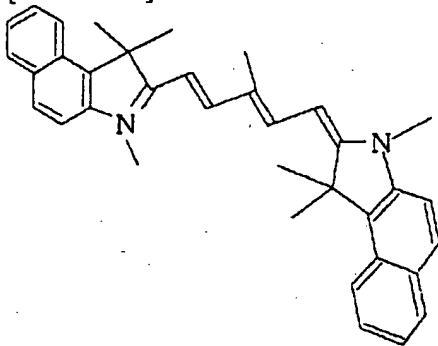
[Example 1]

(1) The polycarbonate substrate with a diameter [of 120mm] and a thickness of 1.2mm which established the tracking slot (guide rail) which lay in a zigzag line periodically in recordable compact disks (CD-R) as a production transparent substrate of CD-R was used.

The following structure expression (1)

[0026]

[Formula 1]



構造式 (1)

[0027] After having come out, carrying out the dissolution of the cyanine dye shown 2.2% of the weight (weight for solvent %) and filtering it to a methyl Cellosolve solvent, it applied by the spin coat method on the above-mentioned substrate. In order to evaporate completely the solvent after an application and in a coloring matter film, dryness was performed for 10 minutes in 80-degree C oven, and the coloring matter film was formed. The thickness of a coloring matter film could be 120nm. Subsequently, the Cu-Ag thin film (Cu content 4 atom %, Ag content 96 atom %) with a thickness of 100nm of 2 yuan was formed by the vacuum deposition in the vacuum layer exhausted to 2×10^{-5} Torr as a reflective film on the coloring matter film. Furthermore, on the reflective film, ultraviolet-rays hardenability resin SD-1700 (the Dainippon Ink chemistry company make) was applied to the thickness of 3 micrometers by the spin coat method, by the black light, ultraviolet rays are irradiated, were stiffened, the protective coat was formed, and CD-R was produced.

[0028] (2) optical disk evaluation equipment DDU-1000 (pulse tech company make) was used for performance-evaluation profit **** CD-R of CD-R, and the EFM signal was recorded on it Next, CD-R which recorded on the bottom of the environment of the temperature of 80 degrees C and 90% of humidity RH was left for 800 hours. Before and after leaving it under this high-humidity/temperature environment, the reflection factor and Cl error (average error generating number per second) were measured. The result is shown in [Table 1].

[0029] [Examples 2-5 and examples 1-4 of comparison] The thing of the composition shown in [Table 1] was used as a reflective film, and also the example 1 was repeated. The performance of produced CD-R was shown in [Table 1].

[0030]

[Table 1]

		反 射 膜 組 成 (原子%)		反 射 率 (%)		C 1 エ ラ ー (平均発生個数)	
		C u	A g	前 ¹⁾	後 ²⁾	前 ¹⁾	後 ²⁾
実 施 例	1	4	96	72	69	3	6
	2	2	98	73	68	2	7
	3	8	92	72	69	3	7
	4	0.5	99.5	73	67	2	8
	5	13	87	72	68	3	8
比 較 例	1	20	80	68	63	9	31
	2	50	50	67	64	9	29
	3	0	100	73	62	2	220
	4	100	0	71	64	2	218

注) : 1) 高温高湿環境放置前
2) 高温高湿環境放置後

[0031] From the result of [Table 1], the fact of following the (1) - (3) is obvious.

(1) Even if CD-R which has the reflective film which consists of Cu-Ag of the composition specified by this invention has a high (b) reflection factor and it leaves it under a high-humidity/temperature environment for a long time, the value can be held by the high level, and even if it leaves the generating number of (b) C1 error under the above-mentioned environment for a long time, it seldom increases.

(2) if CD-R (examples 1 and 2 of comparison) which has the reflective film which consists of Cu-Ag of the composition out of range specified by this invention has a low reflection factor and it is left under a high-humidity/temperature environment for a long time -- the decline in a reflection factor -- so much -- also coming out -- although there is nothing, the generating number of C1 error carries out a considerable increase

(3) Although the reflection factor of CD-R (examples 3 and 4 of comparison) which has the reflective film which consists of Ag or Cu is high, if it is left under a high-humidity/temperature environment for a long time, a reflection factor will carry out a considerable fall and the generating number of C1 error will increase remarkably.

The reflective film which consists of Cu-Ag of the specific composition used for the optical recording medium of this invention has a high reflection factor, and the above fact means excelling in corrosion resistance.

[0032]

[Effect of the Invention] According to this invention, the optical recording medium of the low cost which has the reflective film which was moreover excellent in corrosion resistance with the high reflection factor is offered.

[0033]

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the optical recording medium which has the reflective film excellent in a high reflection factor and corrosion resistance.

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PRIOR ART

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[0003] The alloy which makes Au or Au a principal component is used for the reflective film of CD-R which is one sort of the compact disk in which the above-mentioned record is possible. To the laser wavelength of 780nm for reading the recorded information, even if a coloring matter record layer carries out the reflective film which consists of an alloy which makes Au or Au a principal component under existence, it can realize 65% or more of high reflection factor, and it has high corrosion resistance. However, since the reflective film which consists of an alloy which makes Au or Au a principal component is expensive, it serves as a cause of a cost rise of the above-mentioned CD-R.

[0004] Since it is inferior to corrosion resistance when the alloy which, on the other hand, makes a principal component metals, such as Ag, cheap Cu, cheap aluminum, etc., and these is used as a reflective film, the performance of disks, such as decline in a reflection factor based on corrosion and an increase in an error, carries out aging. Therefore, it excelled in a high reflection factor and corrosion resistance, and, moreover, an appearance of a cheap reflective film was desired to CD-R.

[0005] A reflective film makes a principal component at least one sort of the element chosen from Ag, Au, Cu, and Pt, and the optical magnetic medium which makes a principal component at least one sort of the element with which a middle thin film is chosen from Zn, aluminum, Sn, In, Cd, Tl, Pb, and Bi is indicated by JP,4-228128,A. However, in the official report concerned, Ag reflective film is recognized to be best and neither indication nor suggestion is substantially carried out about the reflective film which consists of Ag and Cu. Moreover, in the official report concerned, the technology about the so-called CD of the write once type which uses a mineral matter as record film is indicated.

[0006] Since a high reflection factor is not needed so much for the reflective film of compact disks (it says Following CD), such as CD-Audio and CD-ROM, which imprints a pit to a substrate and is manufactured on structure using metal mold, aluminum is usually used.

[0007] However, since light is absorbed with the coloring matter concerned in optical disks, such as CD-R which has organic system coloring matter as record film, for example, rather than the above-mentioned compact disk, the high reflective film of a reflection factor is needed and Au is usually used as a reflective film by CD-R as mentioned above. If only a reflection factor is considered, Ag of a reflection factor will be higher than Au. However, since, as for Ag, a reflection factor falls with time by being inferior to corrosion resistance from Au, the reflective film which consists only of Ag is unsuitable as a reflective film of CD-R, and the present condition is that Au still expensive as a reflective film of CD-R is used after all.

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EFFECT OF THE INVENTION

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TECHNICAL PROBLEM

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MEANS

[Means for Solving the Problem] This invention persons did the knowledge of the fact that the thin film which made Cu of the amount of specification contain [as opposed to / Ag / unexpectedly] is moreover excellent in corrosion resistance with a high reflection factor, as a result of inquiring wholeheartedly that the above-mentioned purpose should be attained. this invention was made based on the above-mentioned knowledge, and attains the above-mentioned purpose in the optical recording medium by which the reflective film was prepared on the substrate by offering the optical recording medium by which a reflective film is characterized by the bird clapper from 0.1 to Cu15 atom %, and 85 to Ag99.9 atom %.

[0010] The thin film of the comparatively simple composition which consists of above Cu(s) and Ag was excellent in corrosion resistance, the fact of giving the reflective film for optical recording media of a high reflection factor was not known conventionally, but it was a just surprising fact. Hereafter, the optical recording medium of this invention is explained in detail.

[0011]

[The gestalt for inventing] The optical recording medium in this invention has the structure where the reflective film was prepared on the substrate, and includes what can record information by light, the thing which can read the recorded information by light, the thing which can eliminate or rewrite record by light.

[0012] The optical disk (CD-E) in which elimination of the compact disk (CD) which can read the information which information was recorded by the pit formed as an example of an optical recording medium on the recordable optical disk (CD-R) which has a coloring matter thin film as a record layer, and the substrate, and was recorded by light, other magneto-optic disks (MD or MO), a phase-change optical disk (PD), and record and rewriting are possible can be mentioned.

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[0014] As a material which forms a substrate 2, plastics, glass, etc., such as a polycarbonate and a polymeter kuru acid methyl, can be mentioned. A polycarbonate is desirable especially. The thickness of a substrate 2 is usually 1.2mm. And that in which the spiral guide rail 6 which acts as an irradiation guide of laser is formed is usually used.

[0015] If the energy of light, for example, laser, is absorbed and it generates heat enough as coloring

matter of the coloring matter film 4, it will not be restricted especially. Specifically, the cyanine system coloring matter which is an organic coloring matter, squarylium system coloring matter, crocodile NIUMU system coloring matter, AZURENIUMU system coloring matter, triaryl amine coloring matter, anthraquinone system coloring matter, metal-containing azo system coloring matter, dithiol metallic complex system coloring matter, India aniline metal complex system coloring matter, phthalocyanine system coloring matter, naphthalocyanine system coloring matter, CT complex system coloring matter between molecules, etc. are used suitably. these are independent -- it is -- it can use together and use Moreover, an antioxidant, a binder, etc. can be added on the coloring matter film 4.

[0016] Although the method of dissolving an organic coloring matter in an organic solvent, and carrying out a spin coat on the transparent substrate 2 as a method of forming the coloring matter film 4 containing an organic coloring matter is used preferably, a vacuum deposition can also be used about the coloring matter which has sublimability like phthalocyanine system coloring matter. The thickness of the coloring matter film 4 is suitably chosen according to the optical physical properties of the wavelength to be used and the reflective film 3, the quality of the material of the coloring matter film 4, etc. in consideration of record sensitivity, figure of merit, etc. to the luminous energy used in order to record [laser], and the range of it is usually 120-150nm. Although the coloring matter film 4 is not illustrated, you may prepare it in both sides of a transparent substrate.

[0017] this invention -- setting -- the reflective film 3 -- 0.1 to Cu15 atom % -- it consists of one to 10 atom %, and the remainder Ag preferably Composition of the above-mentioned reflective film 3 is important, and the corrosion-resistant reflective film which was excellent with the reflection factor which was excellent in composition of the above-mentioned range is obtained. When Cu content is under 0.1 atom %, in any [in case Cu content exceeds 15 atom %] case, it is inferior to corrosion resistance, and by aging, a reflection factor falls and error generating at the time of CD-R reading increases.

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[0019] Furthermore, you may perform surface treatment by coupling agent, such as a triazine thiol system compound, to the front face of the above-mentioned reflecting layer film 3 if needed.

[0020] It is suitable to use the material of hard nature, such as acrylic ultraviolet-rays hardening resin, as a protective layer 5 formed on the above-mentioned reflective film 3, and usually, after applying by the thickness of 2-20 micrometers by the spin coat method on a reflective film, it can be made to be able to harden by UV irradiation and can form.

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[0024] Since the above-mentioned optical recording medium of this invention explained above is size so that the reflection factor of the above-mentioned reflective film fulfills CD-R specification, a high output is obtained at the time of reading. When this designs an optical recording medium, there is an advantage to which the width of face of selection of the coloring matter in the case of CD-R spreads.

Moreover, even when designing CD drive, the width of face of selection of the kind of laser beam used at the time of reading spreads, and even if the power of a laser beam falls somewhat by a certain reason, the advantage on the design of being able to continue and use it may arise further. Moreover, since the above-mentioned reflective film is excellent in corrosion resistance, the decline in the reflection factor accompanying the passage of time and the increase in generating of a reading error are suppressed. And since the above-mentioned reflective film is cheap, the contribution to the cost reduction of an optical recording medium is size.

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MEANS

[Means for Solving the Problem] This invention persons did the knowledge of the fact that the thin film which made Cu of the amount of specification contain [as opposed to / Ag / unexpectedly] is moreover excellent in corrosion resistance with a high reflection factor, as a result of inquiring wholeheartedly that the above-mentioned purpose should be attained. this invention was made based on the above-mentioned knowledge, and attains the above-mentioned purpose in the optical recording medium by which the reflective film was prepared on the substrate by offering the optical recording medium by which a reflective film is characterized by the bird clapper from 0.1 to Cu15 atom %, and 85 to Ag99.9 atom %.

[0010] The thin film of the comparatively simple composition which consists of above Cu(s) and Ag was excellent in corrosion resistance, the fact of giving the reflective film for optical recording media of a high reflection factor was not known conventionally, but it was a just surprising fact. Hereafter, the optical recording medium of this invention is explained in detail.

[0011]

[The gestalt for inventing] The optical recording medium in this invention has the structure where the reflective film was prepared on the substrate, and includes what can record information by light, the thing which can read the recorded information by light, the thing which can eliminate or rewrite record by light.

[0012] The optical disk (CD-E) in which elimination of the compact disk (CD) which can read the information which information was recorded by the pit formed as an example of an optical recording medium on the recordable optical disk (CD-R) which has a coloring matter thin film as a record layer, and the substrate, and was recorded by light, other magneto-optic disks (MD or MO), a phase-change optical disk (PD), and record and rewriting are possible can be mentioned.

[0013] First, the recordable compact disk (CD-R) which is one mode of the optical recording medium of this invention is explained, referring to [drawing 1]. [Drawing 1] is the type section view of the direction of a radius of CD-R, and the coloring matter film 4 as a record layer, the reflective film 3 which consists of Cu-Ag, and the protective coat 5 are carrying out the laminating in this sequence on the transparent substrate 2 to the light to be used. In the reflective film concerning this invention, any of the gestalt of the mixture [gestalt / [the alloy as used in the field of this invention means what was defined by the item of the alloy of the Iwanami physicochemistry dictionary (the 3rd edition enlarged edition of February 24, 1981 issue)] / of the alloy which consists of Cu-Ag] of Cu and Ag, or the gestalt to which the laminating of the thin film which consists of Cu, and the thin film which consists of Ag was carried out are sufficient. Moreover, although the gestalt with which they were joined is sufficient, the thin film formation by the vacuum deposition is simple.

[0014] As a material which forms a substrate 2, plastics, glass, etc., such as a polycarbonate and a polymeter kuru acid methyl, can be mentioned. A polycarbonate is desirable especially. The thickness of a substrate 2 is usually 1.2mm. And that in which the spiral guide rail 6 which acts as an irradiation guide of laser is formed is usually used.

[0015] If the energy of light, for example, laser, is absorbed and it generates heat enough as coloring

matter of the coloring matter film 4, it will not be restricted especially. Specifically, the cyanine system coloring matter which is an organic coloring matter, squarylium system coloring matter, crocodile NIUMU system coloring matter, AZURENIUMU system coloring matter, triaryl amine coloring matter, anthraquinone system coloring matter, metal-containing azo system coloring matter, dithiol metallic complex system coloring matter, India aniline metal complex system coloring matter, phthalocyanine system coloring matter, naphthalocyanine system coloring matter, CT complex system coloring matter between molecules, etc. are used suitably. these are independent -- it is -- it can use together and use Moreover, an antioxidant, a binder, etc. can be added on the coloring matter film 4.

[0016] Although the method of dissolving an organic coloring matter in an organic solvent, and carrying out a spin coat on the transparent substrate 2 as a method of forming the coloring matter film 4 containing an organic coloring matter is used preferably, a vacuum deposition can also be used about the coloring matter which has sublimability like phthalocyanine system coloring matter. The thickness of the coloring matter film 4 is suitably chosen according to the optical physical properties of the wavelength to be used and the reflective film 3, the quality of the material of the coloring matter film 4, etc. in consideration of record sensitivity, figure of merit, etc. to the luminous energy used in order to record [laser], and the range of it is usually 120-150nm. Although the coloring matter film 4 is not illustrated, you may prepare it in both sides of a transparent substrate.

[0017] this invention -- setting -- the reflective film 3 -- 0.1 to Cu15 atom % -- it consists of one to 10 atom %, and the remainder Ag preferably Composition of the above-mentioned reflective film 3 is important, and the corrosion-resistant reflective film which was excellent with the reflection factor which was excellent in composition of the above-mentioned range is obtained. When Cu content is under 0.1 atom %, in any [in case Cu content exceeds 15 atom %] case, it is inferior to corrosion resistance, and by aging, a reflection factor falls and error generating at the time of CD-R reading increases.

[0018] The above-mentioned reflective film 3 can be formed by the well-known sputtering method and the vacuum deposition method in itself through direct or other films on the above-mentioned coloring matter film 4. As for the thickness of the above-mentioned reflective film 3, it is desirable to be referred to as 50-150nm.

[0019] Furthermore, you may perform surface treatment by coupling agent, such as a triazine thiol system compound, to the front face of the above-mentioned reflecting layer film 3 if needed.

[0020] It is suitable to use the material of hard nature, such as acrylic ultraviolet-rays hardening resin, as a protective layer 5 formed on the above-mentioned reflective film 3, and usually, after applying by the thickness of 2-20 micrometers by the spin coat method on a reflective film, it can be made to be able to harden by UV irradiation and can form.

[0021] Next, information is recorded by the combination of two or more pits formed in the substrate which is other one mode of the optical recording medium of this invention, and the compact disk (CD) which reads this recording information by light is explained with reference to [drawing 2]. [Drawing 2] is the type section view of the direction of a truck of CD, and the laminating of the reflective film 3 and the protective coat 5 is carried out to the transparent substrate 2 in this sequence to the light to be used.

[0022] What indicated CD-R can be used as a material which forms the above-mentioned substrate 2, and it is a polycarbonate preferably. The thickness of a substrate 2 is also the thickness which indicated the case of CD-R. Two or more pits 7 exist in the above-mentioned substrate, and information is recorded on it by these pits.

[0023] The thickness of composition of Cu-Ag which forms the reflective film 3, and a reflective film, the method of forming a reflective film, etc. may be applied including a mode with desirable having indicated CD-R. Having indicated CD-R also about the protective coat furthermore may be applied.

[0024] Since the above-mentioned optical recording medium of this invention explained above is size so that the reflection factor of the above-mentioned reflective film fulfills CD-R specification, a high output is obtained at the time of reading. When this designs an optical recording medium, there is an advantage to which the width of face of selection of the coloring matter in the case of CD-R spreads.

Moreover, even when designing CD drive, the width of face of selection of the kind of laser beam used at the time of reading spreads, and even if the power of a laser beam falls somewhat by a certain reason, the advantage on the design of being able to continue and use it may arise further. Moreover, since the above-mentioned reflective film is excellent in corrosion resistance, the decline in the reflection factor accompanying the passage of time and the increase in generating of a reading error are suppressed. And since the above-mentioned reflective film is cheap, the contribution to the cost reduction of an optical recording medium is size.

[Translation done.]

*** NOTICES ***

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the radial type section view of CD-R.

[Drawing 2] It is the type section view of the direction of CD-truck.

[Description of Notations]

1 CD-R

2 Substrate

3 Reflective Film

4 Coloring Matter Film

5 Protective Coat

6 Guide Rail

7 Pit

11 CD

[Translation done.]